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Serial Number: 16716550
Reply to Official Action dated 5 April 2004

REMARKS/ARGUMENTS

This case has been carefully reviewed and analyzed in view of the Official Action dated 5 April 2004. Responsive to the objections and rejections made in the Official Action, Claims 1, 3-7, 10 and 13-14 have been amended to clarify the language thereof and the combination of elements which form the invention of the subject Patent Application. Additionally, Claims 2, 5, 9, 11 and 12 have been cancelled by this Amendment.

In the Official Action, the Examiner objected to the disclosure due to a number of informalities therein.

In addition to those informalities kindly noted by the Examiner, the Applicants also noted a number of other errors in the Specification and are submitting herewith a Substitute Specification in order to correct the numerous idiomatic, grammatical and translational errors found therein. A clean copy of the Substitute Specification and Abstract are attached to this Amendment in compliance with 37 C.F.R. § 1.125. The Substitute Specification includes the same changes as are indicated in the marked-up copy of the original Specification. It is believed that the subject matter disclosed by the Substitute Specification was previously disclosed in the Specification and Claims, as filed, and the accompanying Drawing Figures. It is not believed that any new matter has been added by these changes.

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In the Official Action, the Examiner rejected Claims 1-4 under 35 U.S.C. § 112, first paragraph, as not being enabled by the Specification. The Examiner stated that the method steps in the Specification, Steps 1-7, were critical or essential to the practice of the invention, but not included in the Claims. The Examiner also rejected Claims 2, 5, 7, 9, 12 and 13 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particular point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner identified a number of terms which lacked proper antecedent basis or were unclear, as well as indicating that Claim 5 did not appear to be further limiting, as required.

Claims 1, 3-7, 10 and 13-14 have been amended to correct the language thereof. It is believed that the Claims now particularly point out and distinctly claim the subject matter that Applicants regard as the invention. Additionally, the Claims now direct themselves to the copper interconnect forming process which includes the oxygen-removing steps and copper forming steps described in the Specification. Thus, it is believed that the Claims are enabled by the Specification and particularly point out and distinctly claim the subject matter that Applicants regard as the invention.

In the Official Action, the Examiner rejected Claims 1-14 under 35 U.S.C. § 103, as being unpatentable over Otsuka, et al., U.S. Patent 4,083,754, or Japanese Patent Publication 2002-115,076. The Examiner stated that the

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Outsuka, et al. reference disclosed an apparatus and method whereby inner gas such as nitrogen or hydrogen is first blown into the plating solution to remove oxygen dissolved therein. The Examiner stated that the Japanese Patent Publication disclosed a displacing gold plating method wherein the formation of an oxide film on a nickel layer is suppressed in the gold plating solution by first treating the solution with nitrogen prior to plating.

Although neither reference disclosed a copper coating for an interconnect or film, the Examiner has taken the position that one skilled in the art at the time the invention was made would have had a reasonable expectation of achieving similar results regardless of the particular metal coating utilized. The Examiner also has taken the position that one skilled in the art would have had a reasonable expectation of achieving similar results with alternative oxygen removing processes, such as boiling.

It is respectfully submitted that the Outsuka, et al. reference is directed to a differential pulse anodic stripping voltammetry apparatus and method. The apparatus and method are utilized for analyzing a minute quantity of a component, especially metals contained in solutions. The analytical method utilizes a plating step to remove the metal from the solution. Prior to plating, an inert gas is first blown into the solution, being analyzed in order to remove oxygen therefrom. However, nowhere does this reference disclose or suggest a method wherein oxygen is removed from a solvent, the solvent being

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subsequently mixed with hydrochloric acid and cupric sulphate to form a reaction solution for use in an electrochemical displacement deposition process. Still further, nowhere does the reference disclose or suggest boiling the solvent, or the solution being analyzed, to remove oxygen therefrom. In fact, the reference teaches away from boiling the solution by its disclosure of utilizing inert gas to displace the oxygen dissolved in the solution.

Still further, it is respectfully submitted that one skilled in the art would not look to the "alternate oxygen removing process of boiling" in the method of Ootsuka, et al. Boiling the solution being analyzed would likely alter the relative concentration of the constituents which are to be analyzed, by the volatilization that occurs during the boiling process.

The Japanese Patent Publication JP 2002-115,076 is directed to a displacement gold plating method. Here again, the gold plating solution (reaction solution) is treated by bubbling nitrogen gas therein. Nowhere does the reference suggest removing dissolved oxygen from the solvent utilized in preparing the reaction solution, nor the use of boiling for such purpose. Here again, one skilled in the art would not look to boiling as an alternative method of removing oxygen from the reaction solution, as such would alter the concentration thereof.

Thus, none of the references relied upon by the Examiner disclose or suggest the concept of removing dissolved oxygen from the solvent before

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being utilized in preparing the reaction solution, but instead utilize a more complex and expensive process for removing the dissolved oxygen from the prepared reaction solution. Thus, neither Otsuka, et al. nor Japanese Patent Publication 2002-115,076 make obvious the invention of the subject Patent Application, as now claimed.

For all of the foregoing reasons, it is now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

Respectfully submitted,
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Date: July 6, 2004